

Research Report
KTC-94-19

1994 SAFETY BELT USAGE SURVEY
AND EVALUATION OF EFFECTIVENESS
IN KENTUCKY

by

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16. Abstract <p>The objective of this study was to establish 1994 safety belt and child safety seat usage rates in Kentucky. The 1994 survey documents the results from enacting a statewide mandatory safety belt law. Data were collected at 100 sites and combined based on vehicle miles travelled for a given type of highway, rural or urban location, and county population category. Also included in this report is an analysis of accident records evaluating the effectiveness of safety belts.</p> <p>The data show that enactment of the statewide law had a dramatic effect on usage rates. The usage rate for drivers increased from 42 percent in 1993 to 58 percent in 1994. While the usage rate for drivers had increased for the past several years, the amount of the increase was decreasing prior to enactment of the statewide law.</p> <p>The statewide usage rate for children under the age of four was determined to be 72 percent. This represents an increase from the 61 percent usage determined in the 1993 survey.</p> <p>Benefits in the reduction of injuries for occupants involved in police-reported accidents wearing a safety belt or in a safety seat were shown through the analysis of accident records. For example, a 56 percent reduction in fatal or incapacitating injuries was determined for drivers wearing a safety belt compared to those who were not restrained.</p>			
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INTRODUCTION

The use of safety belts and child safety seats is an effective means of reducing injuries to motor-vehicle occupants involved in a traffic accident. There have been various types of efforts used to increase safety belt and safety seat usage. Past efforts have included public information campaigns and both local and statewide legislation. The most recent legislation in this area was statewide legislation requiring the use of safety belts. This law was passed in 1994 with an effective date in July 1994.

The first legislation in this area was a law enacted by the 1982 Kentucky General Assembly requiring use of a "child restraint system" for children 40 inches or less in height. The 1988 Kentucky General Assembly strengthened the child restraint law to include a \$50 fine for violation of the law. Also, prior to the statewide law, local safety belt usage laws were enacted in several local jurisdictions in Kentucky. The first such local law, with an effective date of July 1990, was enacted by the Lexington-Fayette Urban County Government. The second local law, with an effective date of July 1991, was enacted by the city of Louisville. Jefferson County later adopted such a law. Other cities and one county which had local safety belt ordinances prior to the statewide legislation included Murray, Bowling Green, Kenton County, Corbin, Bardstown, and Midway. Prior to the statewide law, the combined population of the counties and cities having a local ordinance represented approximately one-third of the statewide population. The statewide law replaced the various local ordinances.

Statewide observational surveys were first conducted in Kentucky in 1982 with data collected in 19 cities across the state. These surveys have been conducted annually since 1982 (with the exception of 1987) to document safety belt and safety seat usage in Kentucky (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11). The number of sites was increased in 1990 in order to obtain a more representative statewide sample (8).

Statewide usage of child safety seats or safety belts for children under 4 years of age increased from about 15 percent in 1982, before enactment of the mandatory child restraint law, to about 30 percent in 1984 and stayed at this level in 1985 and 1986. After a penalty was added to the law, this percentage increased to almost 50 percent in 1988 and 1989 and to 57 percent in 1990 and 1991. The 1993 survey indicated a usage rate of 61 percent. Safety belt usage for the driver has increased each year of the survey. The statewide driver safety belt usage rate was only 4 percent in 1982 compared to 42 percent in 1993.

The objective of the survey summarized in this report is to establish statewide 1994 safety belt and child safety seat usage rates in Kentucky. These rates may be compared to those determined from previous surveys. The 1994

survey documents the results from enacting a statewide mandatory safety belt law. Another objective of this study was to analyze accident data to evaluate the effectiveness of safety belts in reducing injuries to occupants of motor vehicles involved in traffic accidents.

PROCEDURE

DATA COLLECTION PROCEDURE

The data collection procedure used in the surveys was modified starting with the 1990 survey. The procedure used in the 1990 through 1993 surveys was again used in the 1994 survey. The procedure used for the first several surveys was changed in order to obtain a more representative statewide sample as well as to use a procedure that would be comparable to surveys taken in other states. The data collection form was changed along with the site selection procedure.

The data collection form used in the survey is shown in Figure 1. Safety belt usage was recorded for drivers and front-seat passengers sitting in the outboard position. These positions are equipped with a combination lap belt/shoulder harness which enables observations to be performed more easily. The exception was for children under four years of age for which data were collected for all positions in the front and the rear seats. Drivers were classified into three age categories and were classified by sex. Passengers were classified into several age categories. For drivers and front-seat passengers (over three years of age), usage was classified as either using a harness or belt or no restraint. For children one to three years of age, the categories included safety seat, booster seat, harness or belt, or no restraint. For children under one year of age, the categories were either safety seat or no restraint. When a safety seat was used, an attempt was made to determine if there was an obvious misuse.

Two additional types of information were obtained. This information was collected first in the 1993 survey. Use of motorcycle helmets was noted. Also, usage was determined for minority drivers.

The following list of guidelines for data collection was given to each observer, and each data collector went through a training period.

1. Always include the driver so the number of vehicles included in the sample will be known.
2. Include all vehicles at low-volume locations. When taking data on a multi-lane road, generally include only vehicles in the curb or near lane unless the traffic volume and roadway geometrics allow data to be collected in the next lane.

3. Collect data on only one approach at the intersection.
4. If traffic volume is too heavy to collect data for all vehicles, record data for the next vehicle in view after recording data for the prior vehicle.
5. Obtain a random sample of vehicles independent of whether the occupants are wearing a safety belt. Do not attempt to include all vehicles having an occupant wearing a safety belt at a location where all vehicles cannot be obtained.
6. Attempt to include data for children under four years of age for any vehicle in the sample in which such a child is a passenger.
7. Only include vehicles either stopped or moving so slowly that occupants can be readily observed.
8. Excluding children under four years of age, collect data only for drivers and passengers in the right-front seat (exclude the center front and rear seating positions).
9. Do not include old passenger cars not equipped with a safety belt (those without a head rest).
10. Collect data during daylight hours on weekdays and weekends.
11. Collect data for four hours at each site.
12. Begin and end data collection at a specified time not considering whether the occupants are using a safety belt.
13. Collect data for cars, vans, and light trucks.
14. Do not include a vehicle in the count when use by the driver cannot be determined.

As noted, data were collected for four hours at each location. The decision was made to collect data for an equal time period for each location rather than attempt to collect a given sample size.

Data collection was started on July 18, 1994 so that all data were collected after the effective date of the statewide law. Data were collected first at locations in cities which already had a local ordinance.

DATA COLLECTION LOCATIONS

Data for the surveys collected from 1982 through 1989 were conducted at 23 sites in 19 cities. The cities were selected so that they would be distributed across the state. These cities were also selected to represent a range of population categories to account for social and economic factors. In order to be able to relate the survey results to data taken in other states and to include all types of roadways, it was necessary to expand the number of sites to include data in rural locations and for interstates. The distribution of the sites was based on vehicle miles travelled statewide for various categories of roads in counties of varying populations. The variables considered were the rural or urban designation of the road, the functional classification of the road, and the county population. This was done so that roads would be stratified to assure a proper representation of urban and rural areas and different road types. The percentages of vehicle miles travelled on various types of highways in counties within given population ranges are given in Table 1. These percentages represent the proportion of vehicle miles driven on roadways having the given characteristics of the total vehicle miles driven statewide. The data apply to roads for which a traffic volume was available (which is the state-maintained highway system of slightly over 27,000 miles). Local county and city roadways would not be included. The data shown in Table 1 were obtained using 1990 data. There would be little change in the distribution from year to year so the same percentages have continued to be used. This would allow the same locations to be used each year.

The decision was made to take survey data at 100 sites. The number of sites for any type of highway and county population category was equal to the percentage of vehicle miles travelled for the given type of highway and county population. For example, eight percent of all vehicle miles travelled was on rural arterial highways in counties having a population between 10,000 and 25,000 so eight sites were selected on highways meeting this criterion. A computer file was used to prepare a randomly selected list of sections of roadway for each of the categories given in Table 1. This list was used as a source for selecting sites. Data had been collected at 23 sites since 1982, and it was felt that it would be beneficial to maintain an historical record at these sites. Therefore, these sites were maintained. A list of the observation sites is presented in Table 2, and the 23 original sites are identified with an asterisk. Many of the other sites were obtained from the randomly selected list of highway sections.

The sites had to be selected at a location where traffic would stop. A list of all locations having a traffic signal was obtained and used in the selection of sites. Except for some interstate locations, all the sites are at an intersection. Most of the intersections are controlled by a traffic signal. The sites selected to obtain data for interstates were either at an exit ramp or at a rest area. This would be the only exception to the sites being at a typical intersection. Data at an exit

ramp were taken for traffic exiting the interstate at the intersection between the ramp and intersecting roadway. Another variable which was considered was the geographical location of the sites. Sites were selected to assure that they were distributed across the state. Sites were selected in 62 of the 120 counties. The largest number in any one county was eight in Jefferson County. For each category, the county, location (road and intersecting road), and city (nearest city for rural locations) are given in Table 2.

SURVEY DATA ANALYSIS

Safety belt usage rates were obtained for the driver and for all front-seat occupants. Rates were also obtained by driver age and sex and by age of the front-seat occupant. Statewide rates were obtained by weighting the usage determined for a given type of highway and county population by the percentage of vehicle miles given in Table 1 and combining the percentages from the various categories. Confidence intervals for the statewide usage rates were calculated.

For children under four years of age, rates were obtained for both front and rear seating positions as well for combined seating positions. Rates were separated into safety seat, booster seat, and harness or belt.

The 1994 usage rates for the 19 cities previously surveyed were compared to results determined in prior years. The rates for the various types of highway and county population categories were compared. Rates were also compared by region of the state.

ACCIDENT ANALYSIS

The computer files containing all reported accidents in Kentucky (for the years 1989 through 1993) were analyzed to determine the effectiveness of wearing safety belts or riding in a safety seat. The percent reductions in injuries were computed, and statistical tests were conducted to determine if the reductions were significant. This type of analysis was performed for drivers, children age three and under, and front-and rear-seat passengers. The effectiveness of safety belts was related to several factors such as seating position, type of vehicle, and speed limit. The potential annual reduction in traffic accident fatalities and serious injuries and the accident savings from an increase in driver safety belt usage were estimated.

RESULTS

SURVEY DATA ANALYSIS

Driver usage rates for the various types of highways and county population categories are summarized in Table 3. The overall statewide rate in 1994 after the start of the statewide safety belt law, using the data collected at 100 sites and the weighting procedure described, was 58 percent. The sample size was 99,955 drivers. The confidence limits for a probability of 0.99 would be plus or minus 0.4 percent (12). For a given type of highway (excluding rural interstates), the usage rate was higher for counties having larger populations. In several instances, there were large fluctuations in usage rates at survey sites within the same location and population category.

While the data collection procedure changed in 1990, the usage rate may still be compared to the statewide rates from past years. The previous studies showed that driver usage rates statewide had steadily increased from 4.2 percent in 1982 to 42 percent in 1993. However, the rate of the increase had decreased. There was only a three percentage point increase in the two-year period from 1991 to 1993. The 1994 survey shows that a dramatic increase occurred between the 1993 and 1994 data collection periods. This increase would be directly related to the enactment of a statewide safety belt law. The increase in the driver usage rate in 1994 compared to 1993 was determined to be statistically significant (probability of 0.99) (13). The 16 percentage point increase from 1993 to 1994 was the largest increase since the surveys were started in 1982. It represents a 38 percent increase in usage. The second largest increase was seven percentage points from 1990 to 1991.

Usage rates for front-seat passengers for the various types of highways and county population categories are summarized in Tables 4 through 7 for the different age categories. Usage for children in the four to five years of age category was 52 percent plus or minus about 3 percent. This compares to 37 percent for the 1993 survey, and this increase was statistically significant. For children in the 6 to 12 years of age category, the usage rate was 58 percent plus or minus about 2 percent. This compares to 41 percent in 1993, and this increase was statistically significant. For the 13 to 19 years of age category, the usage rate was 55 percent plus or minus about 2 percent. This was an increase from 37 percent in 1993, and this increase was statistically significant. For the category of over 19 years of age, the usage rate was 57 percent plus or minus about one percent. This was an increase from 40 percent in 1993 with this increase statistically significant.

Usage rates for children one through three years of age are given in Table 8 while rates for children under one year of age are given in Table 9. These rates are for children in both the front and the rear seats. The usage rate for children under one year of age (83 percent with a confidence limit of about three percent) was higher than that for children one to three years of age (68 percent with a confidence limit of about two percent). The usage rate for the combination of these categories, or children under four years of age, was 72 percent with confidence limits for a probability of 0.99 percent of about two percent. The sample size for children under four years of age was 3,872. This age category corresponds to the children for which the mandatory child restraint law would apply. This usage rate of 72 percent compares to 57 percent in 1990 and 1991, 62 percent in 1991, and 61 percent in 1992. This percentage was about 15 percent in 1982 before enactment of the child restraint law and increased to approximately 30 percent after enactment of the law having no penalty and increased again to almost 50 percent in 1988 after the addition of a dollar penalty to the child restraint law.

The usage rate for children under four years of age was higher in the rear seat compared to the front seat. For children one to three years of age, the usage rate was 79 percent for the rear seat compared to 55 percent for the front seat. For children under one year old, the usage rate was 87 percent for the rear seat compared to 78 percent for the front seat. There was a higher percentage of children one to three years of age observed in the rear seat (58 percent) while the number in the front and rear seats was closer for children under one year old (54 percent in the rear seat).

Safety belt usage rates for drivers and front-seat passengers, by type of highway, are presented in Table 10. The highest usage rates were on interstates (both rural and urban). This would be related in part to the longer trip lengths and higher speeds on interstates and the tendency of drivers to use safety belts more often for this type of travel. The lowest usage rates were on rural, non-interstate highways with the lowest rate on rural, local highways. This is the only category with a usage rate of under 50 percent. There was substantial variation between highway types. For drivers, the percentage using a safety belt varied from 45 percent on rural, local highways to 70 percent on rural interstates. For front-seat passengers, the percentage for those using a safety belt varied from 44 percent on rural, local highways to 67 percent on rural interstates. For children under four years of age, the percentage using a safety seat or safety belt varied from 56 percent on rural, local highways to 84 percent on urban interstates.

There was a variation in usage by the age and sex of the driver (Table 11). Females had a substantially higher usage rate than males. The category of over 50 years of age had a slightly higher usage rate than either the 31 to 50 or 16 to 30 years of age categories.

The highest usage rate for front-seat passengers was for the under four years of age category (Table 12). This would be expected since the mandatory child restraint law has applied to this age category for several years. The usage rate for the other age categories were similar as that for drivers. The four to five years of age category had the lowest usage rate.

The change in usage of safety belts by drivers in the 19 cities in which data have been collected since 1982 is presented in Table 13. The usage rate was higher in 1994 than in 1993 in all of the 19 cities. The smallest increases were in the three cities (Louisville, Lexington, and Covington) where there was a local ordinance prior to enactment of the statewide law. There was an average increase of 26 percentage points at the remaining 16 cities where there was no local ordinance prior to the statewide law. The increase in usage at these 16 cities ranged from 10 percentage points at Newport to 42 percentage points in Madisonville. This increase at Madisonville represented an increase of 150 percent in the usage rate. Considering all 19 cities, the usage rate ranged from 70 percent in Lexington and Madisonville to 39 percent in Newport. Using the procedure followed in the original surveys where data were taken only at sites in these 19 cities results in a statewide usage rate of 59 percent. This rate is almost identical to that determined using the revised procedure in which data are collected at 100 sites.

The effect of the statewide law can be seen by comparing the usage rate for drivers in 1993 and 1994 at the 100 data collection sites. The usage rate for drivers increased at 99 of the sites. The only decrease was from 73 to 69 percent at an urban interstate location in Jefferson County. There was an increase of over 40 percentage points at two locations (Madisonville and Corydon). There was an increase of between 30 and 39 percentage points at 11 locations with another 27 locations having an increase of between 20 and 29 percentage points. The increase was between 10 and 19 percentage points at 37 locations with another 22 locations having an increase of between 1 and 9 percentage points.

Considering all 100 sites, there was an average increase of 17 percentage points in the usage rates for drivers. The average increase was 6 percentage points at 23 sites at locations where there was a local ordinance existing in 1993 compared to an increase of 21 percentage points at the 77 sites at locations where the statewide law was the first law relating to use of a safety belt.

The change in usage of safety seats or belts by children under four years of age in these 19 cities is presented in Table 14. The usage rate was higher in 1994 than in 1993 at 16 of the 19 cities. The small sample sizes could result in substantial variations in usage rates. The usage rates ranged from over 90 percent in Frankfort to slightly over 50 percent in Lawrenceburg. Using the procedure followed in the original surveys in which data were taken only at sites

in these 19 cities results in a statewide usage rate of 74 percent. This rate was within two percentage points of that determined using the revised procedure in which data are collected at 100 sites.

A summary of the data collected is given in the Appendix. For each of the 100 data sites, the usage rate and sample size are given for drivers, front-seat passengers (by age category for over four years of age), and children in the one to three years of age and under one year old age categories (both front and rear seat).

Obvious improper usage of safety seats had been estimated in previous surveys. However, improper usage could only be determined when there was a very obvious problem. Since the improper usage percentages were very low compared to studies dealing specifically with this subject, improper usage data were not obtained in this survey.

Helmet use by motorcyclists was noted during the survey. Kentucky has a statewide law requiring the use of a helmet by motorcyclists. The results confirm the expected high usage. All of the 294 observed motorcyclists were wearing a helmet.

Usage for minority drivers was obtained with a sample size of approximately 2,400 drivers. The same procedure used for all drivers was utilized to obtain a statewide usage rate. The statewide usage rate for minority drivers was determined to be 59.5 percent compared to 58.1 percent for all drivers. This shows there was no substantial difference in usage rates for minority drivers.

ACCIDENT ANALYSIS

The number and percentage of all drivers involved in police-reported accidents sustaining a given injury as a function of safety belt usage are summarized in Table 15 (based on 1989 through 1993 accident data). By comparing the percentages, the percent reduction associated with safety belt usage could be calculated. The largest reduction was for a fatal injury (83 percent reduction) with the reduction decreasing for less severe injuries. For comparison, the reduction was 16 percent for the "possible injury" category. The reductions in the percentage of each of the types of injuries were determined to be statistically significant (probability of 0.99). In severe accidents, use of a safety belt would lessen, but not eliminate, the injury. This resulted in the smaller reductions in the less severe injury classifications. There was a 56 percent reduction in a driver sustaining a fatal or severe injury in a traffic accident when a safety belt was worn compared to not wearing a safety belt. This agrees with other research studies which report that lap and shoulder safety belts, when used, reduce the risk of fatal or serious occupant injuries by between 40 and 55 percent (14).

The effectiveness of safety belts in reducing driver injuries was related to several variables. In Table 16, the percentage of drivers sustaining either a fatal or severe injury who were wearing or not wearing a safety belt was related to type of vehicle, type of accident, and speed limit. There were reductions in the percentage of fatal or severe injuries for drivers of passenger cars, single-unit trucks, and combination trucks. The reduction was slightly higher for drivers of trucks. The severity of injuries to drivers of passenger cars was higher than for drivers of trucks. Safety belts also reduced the percentage for fatally or severely injured in various types of accidents. The types of accidents were chosen to represent the extremes of accidents in terms of severity. Reductions were noted for the relatively low severity rear-end accidents as well as the more severe fixed object, head-on, and "overturned" accidents. Safety belts also were determined to be effective in reducing fatal or severe injuries for accidents occurring on either 35-mph local streets or 55-mph high speed roadways.

The number and percentage of children age three and under sustaining a given injury as a function of using a safety seat or safety belt are summarized in Table 17. There were substantial reductions, higher for the most severe injury types, associated with using either a safety seat or safety belt. The reductions were fairly similar for use of either the safety seat or safety belt. The reductions for all injury categories, except fatalities, were statistically significant (probability of 0.99). Of 44 fatalities, 18 involved children not using a safety seat or safety belt. The percent reductions were generally higher than that for drivers (as given in Table 15). There was a 71 percent reduction in the chance of a child less than age four, involved in a traffic accident, sustaining a fatal or severe injury when a safety seat was used compared to not using any restraining device. Also, as shown in Table 18, the reductions in injuries applied to both the rear-and front-seating positions. The data in Table 18 show that accident severity was less in the rear than in the front seat.

The number and percentage of occupants other than drivers sustaining a given injury as a function of safety belt usage are listed in Table 19. As with drivers, there was a large reduction in the percent injured (all reductions were statistically significant with a probability of 0.99). Overall, these percent reductions were generally slightly higher than that for drivers. The chance of a vehicle occupant, other than the driver, sustaining a fatal or severe injury in a traffic accident was reduced by 56 percent if a safety belt was worn compared to not wearing a safety belt.

The accident severities associated with using a lap belt and/or shoulder harness for occupants other than the driver (by seating position in the front or rear seat) are listed in Table 20. Only a lap belt was available in the rear seat in the majority of vehicles involved in accidents in the time period studied. The use of a shoulder harness and/or lap belt in the front seat or a lap belt in the rear

reduced injuries dramatically (all reductions were statistically significant with a probability of 0.99). Accident severity was less in the rear seat and the percent reduction in injuries was generally greater in the rear seat than the front seat. The use of primarily a lap belt in the rear seat has been effective with a reduction in fatal or incapacitating injuries of 65 percent. This finding should not be interpreted to suggest that it would not be preferable to have a combination lap belt/shoulder harness in the rear seat.

The potential annual reductions in traffic accident fatalities and accident savings from an increase in driver safety belt usage are presented in Table 21. The reduction in fatalities and associated accident cost savings were calculated using the reduction factors listed in Table 15, accident data for the years of 1989 through 1993, the 42 percent usage rate determined from the 1993 observational survey, and accident cost estimates recommended by the Federal Highway Administration (15).

SUMMARY

A statewide safety belt law was passed in Kentucky in 1994. The law applies to all vehicle occupants. Prior to the statewide law, there were local ordinances passed in several cities and counties which covered approximately one-third of the statewide population. All of the 1994 survey data were taken after the effective date of the statewide law. The methodology used to obtain statewide safety belt usage rates in 1994 was the same as that used for the surveys taken in 1990 through 1993.

The data show that enactment of the statewide law had a dramatic effect on usage rates. The usage rate for drivers increased from 42 percent in 1993 to 58 percent in 1994. While the usage rate for drivers had increased for the past several years, the amount of the increase was decreasing prior to enactment of the statewide law. (Table 22). With the exception of rural interstates, the rate was generally higher in urban compared to rural areas. The lowest rates were on local roadways in rural counties.

The statewide usage rates for front-seat passengers were also obtained. Considering all passengers, the usage rate was 57 percent. Usage varied with age with the highest usage for the under four years of age category and the lowest usage for the 4 to 5 years of age category, followed by the 13 to 19 years of age category.

Kentucky had a statewide law requiring children under 40 inches in height to be placed in a child restraint prior to the law applying to all occupants. The statewide usage rate for children under the age of four (including both the front and rear seat) was determined to be 72 percent. This represents an increase from

the 61 percent usage determined in the 1993 survey. It appears that the new law had a positive effect on the usage rate for children under four years of age.

A usage rate was determined for minority drivers. The data show there was no difference in usage for minority drivers, compared to all drivers. The compliance of motorcyclists with the requirement to wear a helmet was confirmed. All observed motorcyclists were wearing their helmet.

The significant benefits, based upon the reduction of injuries, for occupants involved in a police-reported accident wearing a safety belt or in a safety seat were shown through the analysis of accident records. For example, one finding was that there was a 56-percent reduction in fatal or incapacitating injuries for drivers wearing a safety belt compared to those who were not. The benefit, in terms of the reduction in injuries, from wearing a safety belt in either the front or rear seat was documented. The potential savings in fatalities, serious injuries, and accident costs which could be obtained from an increase in the use of safety belts was shown. For example, an increase in the driver usage rate up to 70 percent usage would result in a potential annual reduction of 169 fatalities and an annual accident savings from the reduction in fatalities and serious injuries of about 297 million dollars.

RECOMMENDATIONS

The data show that enactment of the statewide safety belt law resulted in a dramatic increase in usage rates. However, results from other states show that the statewide usage rate of 58 percent for drivers can be increased. Public information and education concerning the law and the reasons to wear safety belts should continue. Also, enforcement of the law along with public information about this enforcement and resulting citations should be increased. The survey data can be used to identify areas in need of additional enforcement and education.

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Figure 1. Data Collection Form.

SAFETY BELT DATA COLLECTION FORM

Date: _____ Starting Time: _____ Ending Time: _____ Int # _____
 Location: _____ Sheet No.: _____
 Observer: _____ Comment: _____

DRIVER USAGE

Age & Sex	Harness or Belt	None
16-30 M		
31-50 M		
> 50 M		
16-30 F		
31-50 F		
>50 F		
MINORITY		

FRONT-SEAT OCCUPANT USAGE (OVER 3 YEARS OF AGE)

Age	Harness or belt	None
4-5		
6-12		
13-19		
Over 19		

USAGE FOR CHILDREN 1-3 YEARS OF AGE

	Safety seat	Safety seat (Improper)	Booster seat	Harness or Belt	None
Front					
Rear					

USAGE FOR INFANTS (UNDER 1 YEAR OF AGE)

	Safety Seat	Safety seat(Improper)	None
Front			
Rear			

Helmet Y-
N-

TABLE 1. DISTRIBUTION OF VEHICLE MILES TRAVELED BY TYPE OF HIGHWAY
AND COUNTY POPULATION

TYPE OF HIGHWAY	COUNTY POPULATION	PERCENTAGE OF ALL VEHICLE MILES
Rural Interstate	Over 100,000	1.04
	50,001-100,000	2.78
	25,001-50,000	4.96
	10,000-25,000	5.19
	Under 10,000	1.32
Rural Arterial	Over 50,000	3.14
	25,001-50,000	7.36
	10,000-25,000	8.12
	Under 10,000	1.93
Rural Collector	Over 100,000	0.65
	50,001-100,000	3.19
	25,001-50,000	7.70
	10,000-25,000	9.72
	Under 10,000	2.28
Rural Local	Over 50,000	0.74
	25,000-50,000	1.74
	Under 25,000	3.74
Urban Interstate	Over 100,000	8.32
	50,000-100,000	1.49
	Under 50,000	1.06
Urban Arterial	Over 100,000	10.23
	25,000-100,000	9.52
	Under 25,000	1.79
Urban Collector or Local	All	1.99

TABLE 2. STATEWIDE SURVEY LOCATIONS

TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Rural Interstate	Over 100,000	Fayette, I 64 at KY 859, Lexington
	50,001-100,000	Boyd, I 64 at US 23, Catlettsburg Christian, I 24 at US 41A, Hopkinsville Hardin, I 65 at rest area, Sonora
	25,001-50,000	Barren, I 64 at KY 70, Cave City Boone, I 75 at rest area, Florence Clark, I 64 at KY 627, Winchester Franklin, I 64 at US 60, Frankfort Laurel, I 75 at KY 80, London
	10,000-25,000	Henry, I 71 at KY 153, Sligo Rockcastle, I 75 at US 25, Mt. Vernon Scott, I 75 at rest area, Georgetown Shelby, I 64 at KY 53, Shelbyville Woodford, I 64 at KY 341, Midway
	Under 10,000	Trigg, I 24 at US 68, Cadiz
Rural Arterial	Over 50,000	Pike, US 460 at KY 122, Shalbiana Daviess, US 60 at KY 144, Owensboro Hardin, US 31W at KY 835, West Point
	25,001-50,000	Perry, KY 15X at KY 476, Hazard* Knox, US 25E at KY 225, Barbourville Harlan, US 119 at KY 179, Cumberland Floyd, KY 80 at US 23, Allen Bullitt, US 31E at KY 44, Mt. Washington Carter, KY 1 at I 64, Grayson Laurel, US 25 at KY 80, London
	10,000-25,000	Mason, US 62 at KY 11, Maysville* Clay, US 421 at KY 80, Manchester Bourbon, US 68 at 5th St., Millersburg Casey, US 127 at KY 70, Liberty Meade, US 31W at KY 1638, Muldraugh Lincoln, US 127 at KY 78, Hustonville Russell, US 127 at KY 80, Russell Springs Washington, US 150 at KY 55, Springfield
	Under 10,000	Cumberland, KY 90 at KY 61, Burkesville Ballard, US 60 at KY 358, LaCenter

TABLE 2. STATEWIDE SURVEY LOCATIONS (continued)

TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Rural Collector	Over 100,000	Fayette, KY 418 at I 75, Lexington
	50,001-100,000	Christian, US 41 at KY 1682, Hopkinsville McCracken, US 62 at US 68, Paducah Madison, KY 52 at KY 876, Richmond
	25,001-50,000	Barren, KY 255 at US 31W, Park City Nelson, US 62 at KY 48, Bloomfield Boone, KY 18 at KY 237, Burlington Oldham, KY 146 at KY 393, Buckner Knox, KY 11 at US 25E, Barbourville Henderson, KY 145 at US 60, Corydon Boyle, US 68 at US 150, Perryville Greenup, KY 1 at US 23, Greenup
	10,000-25,000	Caldwell, KY 139 at Jefferson, Princeton* Grayson, US 62 at KY 259, Leitchfield Allen, US 231 at US 31E, Scottsville Bath, US 60 at KY 36, Owingsville Larue, KY 84 at KY 61, Hodgenville Scott, US 62 at I 75, Georgetown Anderson, US 127 at US 127B, Lawrenceburg Breathitt, KY 30 at KY 15, Jackson Webster, US 41 at KY 56, Sebree Garrard, KY 39 at US 27, Lancaster
	Under 10,000	Carroll, US 42 at Highland, Carrollton* Elliott, KY 32 at KY 7, Sandy Hook
Rural Local	Over 50,000	McCracken, KY 1286 at US 62, Paducah
	25,000-50,000	Harlan, KY 840 at US 119, Loyall Greenup, KY 7 at US 23, South Shore
	Under 25,000	Lewis, KY 10 at KY 57, Tollesboro Simpson, KY 73 at KY 100, Franklin Adair, KY 2290 at KY 55, Columbia Taylor, KY 208 at US 68, Campbellsville
Urban Interstate	Over 100,000	Kenton, I 275 at KY 17, Covington Kenton, I 75 at KY 371, Crescent Springs Fayette, I 75 at US 68, Lexington Jefferson, I 64 at KY 1747, Louisville

TABLE 2. STATEWIDE SURVEY LOCATIONS (continued)

TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Urban Interstate	Over 100,000	Jefferson, I 64 at KY 1631, Louisville Jefferson, I 264 at US 31E, Louisville Jefferson, I 264 at US 42, Louisville Jefferson, I 264 at US 60, Louisville
	50,000-100,000	Warren, I 65 at US 231, Bowling Green
	Under 50,000	Boone, I 71 at KY 14, Verona
Urban Arterial	Over 100,000	Jefferson, US 31W at Gagel, Louisville* Jefferson, KY 1447 at Hubbards, Louisville* Jefferson, KY 1703 at Trevillian Way, Louisville* Fayette, US 27 at KY 1683, Lexington* Fayette, Reynolds at Lansdowne, Lexington* Fayette, KY 4 at KY 353, Lexington* Kenton, US 25 at KY 236, Covington Kenton, KY 8 at KY 17, Covington Kenton, KY 16 at KY 177, Covington Fayette, US 25 at Fontaine, Lexington
	25,000-100,000	Campbell, US 27 at Carothers, Newport* Christian, US 41 at Ninth, Hopkinsville* Hopkins, US 41A at KY 70, Madisonville* Pulaski, US 27 at KY 80, Somerset* Franklin, US 60 at Sunset, Frankfort* Henderson, US 41A at First, Henderson* Nelson, US 31E at Beall, Bardstown Barren, US 68 at Race, Glasgow* Clark, US 60 at KY 1958, Winchester* Warren, US 31W at US 231, Bowling Green
	Under 25,000	Anderson, US 62 at US 127, Lawrenceburg* Rowan, US 60 at KY 32, Morehead*
	All	Hardin, Poplar at Sycamore, Elizabethtown* Kenton, KY 1072 at Highland, Covington*

* Original data collection site.

TABLE 3. DRIVER USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	76	174
	50,001-100,000	72	1,334
	25,001-50,000	68	2,877
	10,000-25,000	69	1,804
	Under 10,000	82	191
Rural Arterial	Over 50,000	62	3,728
	25,001-50,000	54	7,506
	10,000-25,000	54	8,561
	Under 10,000	44	1,485
Rural Collector	Over 100,000	67	1,247
	50,001-100,000	58	3,318
	25,001-50,000	51	6,324
	10,000-25,000	49	8,368
	Under 10,000	48	2,446
Rural Local	Over 50,000	67	601
	25,000-50,000	44	978
	Under 25,000	40	2,534
Urban Interstate	Over 100,000	68	9,566
	50,000-100,000	71	1,036
	Under 50,000	49	224
Urban Arterial	Over 100,000	63	13,928
	25,000-100,000	59	15,740
	Under 25,000	52	2,994
Urban Collector or Local	All	59	2,991
ALL	All	58	99,955

TABLE 4. FRONT-SEAT PASSENGER (AGE 4-5 YEARS) USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	50	2
	50,001-100,000	67	15
	25,001-50,000	53	34
	10,000-25,000	80	20
	Under 10,000	100	1
Rural Arterial	Over 50,000	49	51
	25,001-50,000	48	123
	10,000-25,000	40	150
	Under 10,000	26	23
Rural Collector	Over 100,000	72	18
	50,001-100,000	66	41
	25,001-50,000	53	101
	10,000-25,000	34	102
	Under 10,000	32	56
Rural Local	Over 50,000	57	14
	25,000-50,000	38	24
	Under 25,000	22	45
Urban Interstate	Over 100,000	57	134
	50,000-100,000	50	12
	Under 50,000	67	3
Urban Arterial	Over 100,000	64	232
	25,000-100,000	57	176
	Under 25,000	47	43
Urban Collector or Local	All	54	57
ALL	All	52	1,477

TABLE 5. FRONT-SEAT PASSENGER (AGE 6-12 YEARS) USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	100	8
	50,001-100,000	74	34
	25,001-50,000	62	73
	10,000-25,000	71	49
	Under 10,000	100	2
Rural Arterial	Over 50,000	60	111
	25,001-50,000	59	236
	10,000-25,000	43	249
	Under 10,000	30	40
Rural Collector	Over 100,000	50	22
	50,001-100,000	58	77
	25,001-50,000	52	188
	10,000-25,000	44	190
	Under 10,000	48	85
Rural Local	Over 50,000	91	11
	25,000-50,000	42	38
	Under 25,000	47	114
Urban Interstate	Over 100,000	70	219
	50,000-100,000	55	29
	Under 50,000	56	9
Urban Arterial	Over 100,000	65	342
	25,000-100,000	57	371
	Under 25,000	54	126
Urban Collector or Local	All	65	108
ALL	All	58	2,731

TABLE 6. FRONT-SEAT PASSENGER (AGE 13-19 YEARS) USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	50	10
	50,001-100,000	64	81
	25,001-50,000	59	120
	10,000-25,000	73	88
	Under 10,000	56	16
Rural Arterial	Over 50,000	62	245
	25,001-50,000	50	485
	10,000-25,000	53	495
	Under 10,000	38	130
Rural Collector	Over 100,000	50	32
	50,001-100,000	58	148
	25,001-50,000	52	333
	10,000-25,000	45	416
	Under 10,000	46	145
Rural Local	Over 50,000	71	34
	25,000-50,000	46	63
	Under 25,000	40	205
Urban Interstate	Over 100,000	65	398
	50,000-100,000	64	55
	Under 50,000	50	8
Urban Arterial	Over 100,000	61	583
	25,000-100,000	51	770
	Under 25,000	54	203
Urban Collector or Local	All	55	243
ALL	All	55	5,306

TABLE 7. FRONT-SEAT PASSENGER (OVER 19 YEARS OF AGE) USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	65	49
	50,001-100,000	67	552
	25,001-50,000	65	988
	10,000-25,000	68	603
	Under 10,000	76	89
Rural Arterial	Over 50,000	64	960
	25,001-50,000	55	1,980
	10,000-25,000	54	2,295
	Under 10,000	48	396
Rural Collector	Over 100,000	58	314
	50,001-100,000	56	721
	25,001-50,000	51	1,426
	10,000-25,000	48	2,124
	Under 10,000	50	430
Rural Local	Over 50,000	59	115
	25,000-50,000	46	288
	Under 25,000	40	574
Urban Interstate	Over 100,000	64	1,717
	50,000-100,000	74	371
	Under 50,000	44	73
Urban Arterial	Over 100,000	60	2,981
	25,000-100,000	58	3,362
	Under 25,000	52	703
Urban Collector or Local	All	59	806
ALL	All	57	23,917

TABLE 8. USAGE RATES FOR CHILDREN 1-3 YEARS OF AGE (FRONT AND REAR)

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	67	3
	50,001-100,000	80	30
	25,001-50,000	78	103
	10,000-25,000	80	60
	Under 10,000	80	5
Rural Arterial	Over 50,000	64	83
	25,001-50,000	65	229
	10,000-25,000	55	221
	Under 10,000	48	44
Rural Collector	Over 100,000	94	32
	50,001-100,000	78	94
	25,001-50,000	70	178
	10,000-25,000	58	297
	Under 10,000	50	54
Rural Local	Over 50,000	100	16
	25,000-50,000	55	29
	Under 25,000	48	90
Urban Interstate	Over 100,000	88	231
	50,000-100,000	68	53
	Under 50,000	50	6
Urban Arterial	Over 100,000	72	436
	25,000-100,000	72	512
	Under 25,000	62	118
Urban Collector or Local	All	67	100
ALL	All	68	3,024

TABLE 9. USAGE RATES FOR CHILDREN UNDER 1 YEAR OF AGE (FRONT AND REAR)

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	100	2
	50,001-100,000	85	13
	25,001-50,000	91	21
	10,000-25,000	100	12
	Under 10,000	100	5
Rural Arterial	Over 50,000	85	27
	25,001-50,000	71	66
	10,000-25,000	75	72
	Under 10,000	62	16
Rural Collector	Over 100,000	82	11
	50,001-100,000	92	25
	25,001-50,000	84	49
	10,000-25,000	74	77
	Under 10,000	85	33
Rural Local	Over 50,000	89	9
	25,000-50,000	100	5
	Under 25,000	55	20
Urban Interstate	Over 100,000	93	43
	50,000-100,000	67	15
	Under 50,000	100	2
Urban Arterial	Over 100,000	91	154
	25,000-100,000	83	99
	Under 25,000	71	28
Urban Collector or Local	All	82	44
ALL	All	83	848

TABLE 10. USAGE RATES FOR DRIVERS AND PASSENGERS BY TYPE OF HIGHWAY

TYPE OF HIGHWAY	PERCENT USAGE		
	DRIVERS	FRONT-SEAT PASSENGERS	CHILDREN UNDER FOUR YEARS OF AGE
Rural Interstate	70	67	79
Rural Arterial	55	54	59
Rural Collector	52	51	65
Rural Local	45	44	56
Urban Interstate	67	66	84
Urban Arterial	60	59	71
Urban Collector or Local	59	59	67
ALL	58	57	72

TABLE 11. STATEWIDE USAGE RATE BY AGE AND SEX OF DRIVER

CATEGORY	USAGE RATE (PERCENT)
Male	52
Female	68
16-30 Years of Age	55
31-50 Years of Age	59
Over 50 Years of Age	61

TABLE 12. STATEWIDE USAGE RATE FOR FRONT SEAT PASSENGERS BY AGE CATEGORY

CATEGORY	USAGE RATE (PERCENT)
Under 4	60
4 - 5	52
6 - 12	58
13 - 19	55
Over 19	57

TABLE 13. CHANGE IN USAGE OF SAFETY BELTS BY DRIVERS IN ORIGINAL STATEWIDE SURVEY CITIES

CITY	PERCENT USING SAFETY BELTS											
	1982	1983	1984	1985	1986	1988	1989	1990	1991	1992	1993	1994
Louisville	6	12	13	14	16	25	28	38	70	66	60	66
Lexington	8	10	10	17	24	31	42	80	69	61	65	70
Covington	8	9	12	16	22	28	32	39	37	51	58	59
Hopkinsville	3	3	4	6	10	20	21	24	27	30	27	63
Frankfort	5	7	7	11	14	19	24	38	38	46	44	63
Henderson	3	5	7	9	11	20	22	29	29	29	32	62
Newport	5	6	5	6	9	20	26	35	34	34	29	39
Madisonville	2	3	5	8	12	20	22	26	26	27	28	70
Elizabethtown	3	4	5	8	14	20	26	31	34	39	34	60
Winchester	2	3	6	9	12	25	33	37	35	38	32	59
Glasgow	3	3	3	5	6	12	15	19	27	29	26	53
Somerset	2	4	6	7	9	19	26	21	29	28	28	59
Maysville	2	3	6	6	13	19	25	29	34	33	34	54
Morehead	3	3	3	5	7	12	15	22	23	26	28	59
Princeton	2	2	2	3	6	12	15	17	19	20	21	54
Bardstown	4	4	6	7	13	19	21	23	30	40	45	58
Hazard	4	3	4	6	5	10	12	15	19	19	29	52
Lawrenceburg	1	2	3	6	5	9	15	19	22	24	23	43
Carrollton	3	5	5	7	10	16	19	35	34	30	31	51

TABLE 14. CHANGE IN USAGE OF SAFETY SEATS OR BELTS BY CHILDREN UNDER FOUR YEARS OF AGE IN ORIGINAL STATEWIDE SURVEY CITIES

CITY	PERCENT USING SAFETY SEATS OR BELTS											
	1982	1983	1984	1985	1986	1988	1989	1990	1991	1992	1993	1994
Louisville	22	36	49	42	40	68	65	80	86	87	83	88
Lexington	32	46	50	44	46	78	78	91	90	87	81	83
Covington	22	39	49	47	50	59	53	66	67	72	84	74
Hopkinsville	12	19	19	20	21	33	38	40	51	54	56	76
Frankfort	15	26	30	27	30	43	43	57	72	72	62	97
Henderson	14	18	26	30	31	36	42	53	53	58	58	78
Newport	11	27	20	22	22	60	60	57	75	57	46	63
Madisonville	12	18	29	35	38	52	51	54	60	57	59	86
Elizabethtown	11	27	34	30	32	41	42	51	46	63	71	69
Winchester	12	14	33	29	26	56	68	51	53	58	64	74
Glasgow	14	17	20	18	21	36	38	39	47	50	36	67
Somerset	7	23	24	22	26	48	47	48	62	54	61	60
Maysville	12	18	17	19	25	31	34	36	55	58	62	70
Morehead	10	14	13	15	14	25	27	35	51	61	62	72
Princeton	10	12	12	16	20	33	41	52	52	53	60	71
Bardstown	20	21	31	31	31	41	39	42	76	67	75	84
Hazard	7	10	9	11	13	19	20	25	34	50	40	65
Lawrenceburg	7	6	22	23	20	32	29	35	77	65	41	52
Carrollton	6	10	16	22	19	26	28	31	45	62	43	62

TABLE 15. ACCIDENT SEVERITY VERSUS SAFETY BELT USAGE (ALL DRIVERS)*

TYPE OF INJURY	NOT WEARING SAFETY BELT		WEARING SAFETY BELT		PERCENT REDUCTION
	NUMBER	PERCENT	NUMBER	PERCENT	
Fatal	2,005	0.38	370	0.06	83**
Incapacitating	19,305	3.68	9,943	1.72	53**
Non-Incapacitating	33,135	6.32	22,247	3.84	39**
Possible Injury	37,194	7.10	34,363	5.93	16**
Fatal or Incapacitating	21,310	4.07	10,313	1.78	56**

* Based on 1989 through 1993 accident data. Total sample size for not wearing a safety belt was 524,022 compared to 579,629 for wearing a safety belt.

** Statistically significant reduction (probability of 0.99).

TABLE 16. ACCIDENT SEVERITY VERSUS SAFETY BELT USAGE BY TYPE OF VEHICLE, SPEED LIMIT, AND TYPE OF ACCIDENT (ALL DRIVERS)*

VARIABLE	CATEGORY	PERCENT SUSTAINING FATAL OR SEVERE INJURY		PERCENT REDUCTION
		NOT WEARING SAFETY BELT	WEARING SAFETY BELT	
Type of Vehicle	Passenger Car	4.60	2.25	51
	Single-Unit Truck	2.65	1.18	56
	Combination Truck	2.81	1.32	53
Type of Accident (Non-Intersection)	Rear End	1.97	1.41	29
	Fixed Object	15.85	6.41	60
	Head-On	21.99	16.12	27
	Overturned	19.44	7.98	59
Speed Limit (mph)	35	2.91	1.29	56
	45	4.20	1.82	57
	55	9.05	3.92	57

* Based on 1989 through 1993 accident data.

TABLE 17. ACCIDENT SEVERITY VERSUS SAFETY SEAT AND BELT USAGE (CHILDREN AGE THREE AND UNDER)*

TYPE OF INJURY	NOT USING SAFETY SEAT OR BELT		USING SAFETY SEAT		USING SAFETY BELT		PERCENT REDUCTION	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	SAFETY SEAT	SAFETY BELT
Fatal	18	0.10	20	0.09	6	0.03	11	70
Incapacitating	470	2.57	158	0.68	200	0.97	73**	62**
Non-Incapacitating	1,053	5.75	647	2.80	529	2.56	51**	55**
Possible Injury	1,523	8.31	1,050	4.55	1,157	5.61	45**	33**
Fatal or Incapacitating	488	2.66	178	0.77	206	1.00	71**	63**

* Based on 1989 through 1993 accident data. Total sample sizes were 18,319 for not using a safety seat or belt, 23,093 for using a safety seat, and 16,951 for using a safety belt.

** Statistically significant reduction (probability of 0.99).

TABLE 18. ACCIDENT SEVERITY VERSUS SAFETY SEAT AND BELT USAGE BY SEATING POSITION (CHILDREN AGE THREE AND UNDER)*

SEATING POSITION	TYPE OF INJURY	NOT USING SAFETY SEAT OR BELT		USING SAFETY SEAT OR BELT		PERCENT REDUCTION
		NUMBER	PERCENT	NUMBER	PERCENT	
Front	Fatal	14	0.11	9	0.05	55
	Incapacitating	344	2.73	177	0.99	64**
	Non-Incapacitating	773	6.12	599	3.36	45**
	Possible Injury	1,143	9.06	1,070	5.99	34**
	Fatal or Incapacitating	358	2.84	186	1.04	63**
Rear	Fatal	4	0.07	17	0.08	-13
	Incapacitating	126	2.21	137	0.64	71**
	Non-Incapacitating	280	4.91	482	2.25	54**
	Possible Injury	380	6.67	875	4.09	39**
	Fatal or Incapacitating	130	2.28	154	0.72	68**

* Based on 1989 through 1993 accident data. Total sample sizes were 12,622 and 5,697 for not using a safety seat or belt in the front and rear seats, respectively, and 17,833 and 20,877 for using either a safety seat or belt in the front and rear seats, respectively.

** Statistically significant reduction (probability of 0.99).

TABLE 19. ACCIDENT SEVERITY VERSUS SAFETY BELT OR SEAT USAGE (OCCUPANTS OTHER THAN DRIVERS)*

TYPE OF INJURY	NOT USING LAP BELT OR SHOULDER HARNESS		USING LAP BELT AND/OR SHOULDER HARNESS		PERCENT REDUCTION
	NUMBER	PERCENT	NUMBER	PERCENT	
Fatal	904	0.32	174	0.08	76**
Incapacitating	11,802	4.23	4,221	1.90	55**
Non-Incapacitating	23,041	8.26	10,182	4.59	44**
Possible Injury	25,076	8.99	15,925	7.19	20**
Fatal or Incapacitating	12,706	4.55	4,395	1.98	56**

* Based on 1989 through 1993 accident data. Total sample sizes were 279,072 not using a safety belt or seat compared to 221,626 using a safety belt.

** Statistically significant reduction (probability of 0.99).

TABLE 20. ACCIDENT SEVERITY VERSUS SAFETY BELT USAGE (OCCUPANTS OTHER THAN DRIVERS)*

SEATING POSITION	TYPE OF INJURY	NOT USING LAP BELT OR SHOULDER HARNESS		USING LAP BELT AND/OR SHOULDER HARNESS		PERCENT REDUCTION
		NUMBER	PERCENT	NUMBER	PERCENT	
Front	Fatal	697	0.35	142	0.09	73***
	Incapacitating	8,983	4.48	3,354	2.18	51***
	Non-Incapacitating	17,185	8.57	7,643	4.96	42***
	Possible Injury	18,945	9.44	12,220	7.92	16***
	Fatal or Incapacitating	9,680	4.83	3,496	2.27	53***
Rear**	Fatal	207	0.26	32	0.05	82***
	Incapacitating	2,819	3.59	867	1.29	64***
	Non-Incapacitating	5,856	7.46	2,539	3.77	50***
	Possible Injury	6,131	7.81	3,705	5.50	30***
	Fatal or Incapacitating	3,026	3.86	899	1.33	65***

* Based on 1989 through 1993 accident data. Total sample sizes were 200,617 and 78,455 for not using a safety belt in the front seat and rear seat, respectively, and 154,204 and 67,422 for using a safety belt in the front and rear seat, respectively.

** Lap belts only primarily used in rear seats.

*** Statistically significant reduction (probability of 0.99).

TABLE 21. POTENTIAL ANNUAL REDUCTION IN TRAFFIC ACCIDENT FATALITIES AND ACCIDENT SAVINGS FROM INCREASE IN DRIVER SAFETY BELT USAGE*

DRIVER USAGE RATE (PERCENT)	POTENTIAL ANNUAL REDUCTION IN NUMBER OF		ANNUAL ACCIDENT SAVINGS SAVINGS MILLION \$ FROM REDUCTION IN		TOTAL
	FATALITIES	SERIOUS INJURIES**	FATALITIES	SERIOUS INJURIES	
50	48	319	72.0	12.4	84.4
60	109	718	163.5	28.0	191.5
70	169	1,117	253.5	43.6	297.1
80	230	1,515	345.0	59.1	404.1
90	291	1,914	436.5	74.6	511.1
100	351	2,313	526.5	90.2	616.7

* Based on increase from the 42 usage rate determined in the 1993 survey, the percent reductions listed in Table 15, and accident cost estimates recommended by the Federal Highway Administration (15). These costs are \$1,500,000 for a fatality and \$39,000 for an incapacitating injury.

** Serious injuries were defined as those listed as incapacitating on the accident report.

TABLE 22. STATEWIDE USAGE RATES

YEAR	PERCENT USING SAFETY BELTS	
	DRIVERS	CHILDREN UNDER FOUR YEARS OF AGE*
1982	4	15
1983	6	24
1984	7	30
1985	9	29
1986	13	30
1988	21	48
1989	26	49
1990	32	57
1991	39	57
1992	41	62
1993	42	61
1994	58	72

* Children using either safety seat or safety belt.
Children seated in either front or rear seat.

APPENDIX
SUMMARY OF DATA

LIST OF SURVEY LOCATIONS

- | | | | |
|----|---|-----|--|
| 1 | Fayette, I64 at KY 859 | 51 | Bath, US 60 at KY36, Owingsville |
| 2 | Boyd, I64 at US 23 | 52 | Larue, KY 84 at KY 61, Hodgenville |
| 3 | Christian, I24 at US 41A, Hopkinsville | 53 | Scott, US 62 at I75, Georgetown |
| 4 | Hardin, I65 at rest area, Sonora | 54 | Anderson, US 127 at US 127B, Lawrenceburg |
| 5 | Barren, I65 at KY 70, Cave City | 55 | Breathitt, KY 30 at KY 15, Jackson |
| 6 | Boone, I75 at rest area, Florence | 56 | Webster, US 41 at KY 56, Sebree |
| 7 | Clark, I64 at KY 627, Winchester | 57 | Garrard, KY 39 at US 27, Lancaster |
| 8 | Franklin, I64 at US 60, Frankfort | 58 | Carroll, US 42 at Highland, Carrollton |
| 9 | Laurel, I75 at KY 80, London | 59 | Elliott, KY 32 at KY 7, Sandy Hook |
| 10 | Henry, I71 at KY 153, Sligo | 60 | McCracken, KY 1286 at US 62, Paducah |
| 11 | Rockcastle, I75 at US 25, Mt. Vernon | 61 | Harlan, KY 840 at US 119, Loyall |
| 12 | Scott, I75 at rest area, Georgetown | 62 | Greenup, KY 7 at US 23, South Shore |
| 13 | Shelby, I64 at KY 53, Shelbyville | 63 | Lewis, KY 10 at KY 57, Tollesboro |
| 14 | Woodford, I64 at KY 341, Midway | 64 | Simpson, KY 73 at KY 100, Franklin |
| 15 | Trigg, I24 at US 68, Cadiz | 65 | Adair, KY 55 at KY 80, Columbia |
| 16 | Pike, US 460 at KY 122, Shelbyana | 66 | Taylor, KY 208 at US 68, Campbellsville |
| 17 | Daviess, US 60 at KY 144, Owensboro | 67 | Kenton, I275 at KY 17, Covington |
| 18 | Hardin, US 31W at KY 835, West Point | 68 | Kenton, I75 at KY 371, Crescent Springs |
| 19 | Perry, KY 15X at KY 476, Hazard | 69 | Fayette, I75 at US 68, Lexington |
| 20 | Knox, US 25E at KY 225, Barbourville | 70 | Jefferson, I64 at KY 1747, Louisville |
| 21 | Harlan, US 119 at KY 179, Cumberland | 71 | Jefferson, I65 at KY 1631, Louisville |
| 22 | Floyd, KY 80 at US 23, Allen | 72 | Jefferson, I264 at US 31E, Louisville |
| 23 | Bullitt, US 31E at KY 44, Mt. Washington | 73 | Jefferson, I264 at US 42, Louisville |
| 24 | Carter, KY 1 at I64, Grayson | 74 | Jefferson, I264 at US 60, Louisville |
| 25 | Laurel, US 25 at KY 80, London | 75 | Warren, I65 at US 231, Bowling Green |
| 26 | Mason, US 62 at KY 11, Maysville | 76 | Boone, I71 at KY 14, Verona |
| 27 | Clay, US 421 at KY 80, Manchester | 77 | Jefferson, US 31W at Gagel, Louisville |
| 28 | Bourbon, US 68 at 5th St., Millersburg | 78 | Jefferson, KY 1447 at Hubbards, Louisville |
| 29 | Casey, US 127 at KY 70, Liberty | 79 | Jefferson, KY 1703 at Trevillian, Louisville |
| 30 | Meade, US 31W at KY 1638, Muldraugh | 80 | Fayette, US 27 at KY 1683, Lexington |
| 31 | Lincoln, US 127 at KY 78, Hustonville | 81 | Fayette, Reynolds at Lansdowne, Lexington |
| 32 | Russell, US 127 at KY 80, Russell Sprgs. | 82 | Fayette, KY 4 at KY 353, Lexington |
| 33 | Washington, US 150 at KY 55, Springfield | 83 | Kenton, US 25 at KY 236, Covington |
| 34 | Cumberland, KY 90 at KY 61, Burkesville | 84 | Kenton, KY 8 at KY 17, Covington |
| 35 | Ballard, US 60 at KY 358, LaCenter | 85 | Kenton, KY 16 at KY 177, Covington |
| 36 | Fayette, KY 418 at I75, Lexington | 86 | Fayette, US 25 at Fontaine, Lexington |
| 37 | Christian, US 41 at KY 1682, Hopkinsville | 87 | Campbell, US 27 at Carothers, Newport |
| 38 | McCracken, US 62 at KY 68, Paducah | 88 | Christian, US 41 at 9th, Hopkinsville |
| 39 | Madison, KY 52 at KY 876, Richmond | 89 | Hopkins, US 41A at KY 70, Madisonville |
| 40 | Barren, KY 255 at US 31W, Park City | 90 | Pulaski, US 27 at KY 80, Somerset |
| 41 | Nelson, US 62 at KY 48, Bloomfield | 91 | Franklin, US 60 at Sunset, Frankfort |
| 42 | Boone, KY 18 at KY 237, Burlington | 92 | Henderson, US 41A at First St., Henderson |
| 43 | Oldham, KY 146 at KY 393, Buckner | 93 | Nelson, US 31E at Beall, Bardstown |
| 44 | Knox, KY 11 at US 25E, Barbourville | 94 | Barren, US 68 at Race St., Glasgow |
| 45 | Henderson, KY 145 at US 60, Corydon | 95 | Clark, US 60 at KY 1958, Winchester |
| 46 | Boyle, US 68 at US 150, Perryville | 96 | Warren, US 31W at US 231, Bowling Green |
| 47 | Greenup, KY 1 at US 23, Greenup | 97 | Anderson, US 62 at US 127, Lawrenceburg |
| 48 | Caldwell, KY 139 at Jefferson, Princeton | 98 | Rowan, US 60 at KY 32, Morehead |
| 49 | Grayson, US 62 at KY 259, Leitchfield | 99 | Hardin, Poplar at Sycamore, Elizabethtown |
| 50 | Allen, US 231 at US 31E, Scottsville | 100 | Kenton, KY 1072 at Highland, Covington |

TABLE A-1. SUMMARY OF DATA

LOCATION NUMBER	FRONT-SEAT PASSENGERS										FRONT AND REAR					
	DRIVERS		4-5 Years		6-12 Years		13-19 Years		OVER 19 Years		UNDER 4 Years		1-3 Years		UNDER 1 Year	
	SAMPLE	USAGE*	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE
1	174	76	2	50	8	100	10	50	49	65	3	67	3	67	2	100
2	574	67	5	80	10	80	35	51	175	56	6	83	9	78	5	100
3	459	76	7	86	17	76	31	77	194	70	6	83	8	100	6	67
4	301	75	3	0	7	57	15	67	183	73	5	60	13	69	2	100
5	592	67	6	50	15	60	46	52	327	70	14	57	34	76	8	88
6	420	75	7	57	9	67	14	71	165	70	10	60	27	85	7	86
7	567	57	7	43	15	60	18	61	140	57	8	38	18	67	2	100
8	615	73	1	100	13	85	10	80	126	66	5	60	13	77	2	100
9	683	66	13	54	21	48	32	66	230	60	4	50	11	82	2	100
10	318	61	3	100	13	46	20	65	101	61	7	71	13	77	2	100
11	477	70	2	100	19	89	29	79	230	72	10	50	16	63	4	100
12	335	72	2	50	6	50	6	83	122	71	5	80	16	88	3	100
13	402	66	8	75	7	86	23	70	87	68	1	100	6	100	1	100
14	272	78	5	80	4	75	10	70	63	62	6	83	9	89	2	100
15	191	82	1	100	2	100	16	56	89	76	2	100	5	80	5	100
16	824	54	19	37	20	55	67	55	243	53	11	64	11	55	9	100
17	1,365	58	13	62	44	61	110	60	246	56	20	60	41	59	11	73
18	1,539	69	19	53	47	62	68	72	471	73	14	57	31	74	7	86
19	1,435	52	12	42	20	35	54	28	427	50	25	36	49	63	11	73
20	1,104	55	17	53	49	57	95	57	338	60	28	50	43	67	19	53
21	598	46	8	38	5	40	25	44	142	45	13	15	23	48	2	50
22	843	66	14	57	25	52	68	53	251	63	9	67	14	79	3	100
23	947	55	18	39	49	65	57	54	164	62	33	64	51	75	14	100
24	965	50	20	60	9	56	49	47	262	49	16	69	14	64	5	100
25	1,614	53	34	44	79	66	137	53	396	56	26	42	35	54	12	50
26	1,514	54	25	32	34	50	70	46	391	54	23	57	34	65	10	90
27	1,088	45	22	27	39	33	52	71	320	42	18	28	23	35	7	71
28	1,088	51	7	71	25	32	28	46	285	56	15	60	33	52	3	100
29	780	45	19	26	25	28	73	40	194	47	26	35	33	33	14	57
30	1,603	67	23	52	33	64	87	61	465	67	19	68	35	74	15	80
31	386	65	7	57	14	57	26	62	145	65	9	78	12	83	6	67
32	880	48	21	38	46	46	78	51	238	50	18	39	34	44	9	56
33	1,222	54	26	46	33	36	81	53	257	50	8	75	17	71	8	100
34	684	38	13	31	30	30	61	36	176	41	20	15	29	34	8	38
35	801	48	10	20	10	30	69	41	220	54	10	60	15	73	8	88
36	1,247	67	18	72	22	50	32	50	314	58	11	100	32	94	11	82
37	851	58	11	91	18	56	47	55	176	57	13	85	18	83	16	94
38	894	59	16	56	15	47	54	54	232	59	15	47	13	38	4	75
39	1,573	58	14	57	44	64	47	66	313	53	30	67	63	84	5	100
40	431	52	4	75	10	40	24	46	167	56	7	57	22	77	3	100
41	415	40	5	80	23	43	19	26	84	49	6	33	7	57	2	50
42	1,597	49	16	63	20	50	44	61	253	51	21	71	39	79	10	90
43	1,123	56	22	68	49	67	85	59	167	50	20	65	44	73	8	75
44	925	52	13	38	15	33	46	39	295	52	16	56	21	67	11	91
45	330	65	5	40	10	60	15	53	73	67	5	80	9	56	3	67
46	759	57	10	50	13	46	39	59	177	59	11	64	18	61	9	89
47	744	43	26	38	48	48	61	49	210	36	12	42	18	61	3	67
48	1,187	54	8	63	28	54	67	45	183	46	18	50	29	69	5	80
49	1,407	47	16	19	22	41	27	59	408	45	16	56	41	68	12	100
50	671	46	8	50	13	62	52	48	183	46	9	56	11	27	3	100
51	979	39	15	47	53	32	80	33	217	44	28	46	52	48	13	77
52	277	46	12	17	6	50	19	47	101	39	10	50	15	53	1	100
53	815	66	4	75	7	71	17	76	246	70	15	80	30	87	5	100
54	868	57	6	33	11	55	25	60	283	63	16	63	30	80	5	80
55	705	38	8	25	8	25	22	18	231	34	25	24	43	40	5	100
56	730	48	16	19	24	38	53	38	113	42	22	23	27	30	20	40
57	729	43	9	44	18	56	54	52	159	41	10	60	19	63	8	63
58	1,798	51	33	42	65	52	78	51	267	58	40	55	45	51	24	83
59	648	40	23	17	20	35	67	39	163	37	11	45	9	44	9	89
60	601	67	14	57	11	91	34	71	115	59	9	89	16	100	9	89
61	345	53	5	40	6	33	16	50	121	50	7	43	17	53	2	100
62	633	39	19	37	32	44	47	45	167	43	6	33	12	58	3	100
63	312	35	5	20	9	33	20	30	73	34	3	33	4	25	1	100

TABLE A-1. SUMMARY OF DATA (continued)

LOCATION NUMBER	FRONT-SEAT PASSENGERS										FRONT AND REAR					
	DRIVERS		4-5 Years		6-12 Years		13-19 Years		OVER 19 Years		UNDER 4 Years		1-3 Years		UNDER 1 Year	
	SAMPLE	USAGE*	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE
64	210	42	3	33	2	0	12	58	39	36	5	40	5	40	2	100
65	1,723	40	31	23	86	49	145	39	401	42	39	31	76	49	15	47
66	289	45	6	17	17	53	28	46	61	38	4	75	5	60	2	50
67	1,288	57	20	65	40	60	72	63	284	56	25	76	53	75	10	100
68	1,311	60	17	59	29	69	78	59	288	67	10	100	19	95	6	100
69	694	76	11	36	14	86	36	64	189	64	4	50	11	82	2	50
70	1,394	73	17	59	37	68	29	72	253	72	23	78	35	89	3	67
71	1,323	63	20	45	16	25	59	59	171	57	20	85	23	91	9	89
72	988	71	19	58	20	95	26	85	183	66	8	100	18	100	1	100
73	1,430	69	13	62	20	75	52	52	133	59	22	86	39	92	9	100
74	1,138	76	17	65	43	79	46	85	216	70	19	89	33	94	3	100
75	1,036	71	12	50	29	55	55	64	371	74	22	59	53	68	15	67
76	224	49	3	67	9	56	8	50	73	44	3	33	6	50	2	100
77	1,761	59	23	70	33	82	68	69	302	66	24	71	27	59	18	100
78	1,591	70	25	96	61	72	86	59	210	64	16	94	34	97	21	100
79	1,490	71	15	60	27	93	56	75	290	67	6	100	13	92	0	NA
80	1,787	73	39	77	38	74	101	71	387	76	28	89	38	84	24	96
81	609	68	21	76	17	88	11	64	87	57	25	96	38	97	17	100
82	1,391	65	26	58	35	69	65	57	380	62	29	66	65	68	11	73
83	1,442	58	21	62	33	52	34	59	384	56	34	74	62	76	16	100
84	1,558	46	19	32	44	36	79	39	301	49	33	33	62	44	18	50
85	1,173	46	28	36	34	41	50	48	406	45	30	57	64	64	13	100
86	1,126	69	15	60	20	60	33	73	234	60	19	84	33	82	16	94
87	1,596	39	28	32	62	37	73	27	324	44	41	49	85	60	9	89
88	1,745	63	10	80	41	66	67	52	285	55	23	74	42	76	9	78
89	1,880	70	15	73	38	76	72	65	313	64	20	75	62	87	4	75
90	1,276	59	23	35	44	55	139	56	481	62	19	47	56	61	17	59
91	1,551	63	19	47	19	58	73	58	345	61	6	83	20	95	11	100
92	1,540	62	13	69	22	59	48	42	277	59	20	75	54	76	4	100
93	1,565	58	40	73	73	59	83	53	288	63	39	82	56	80	21	95
94	1,308	53	16	63	37	51	60	58	323	53	19	47	48	63	6	100
95	1,355	51	5	40	10	60	28	36	250	55	17	65	33	73	3	100
96	1,924	63	7	71	25	68	127	50	476	62	34	65	56	73	15	67
97	1,404	43	22	41	45	40	52	44	268	43	24	67	50	48	10	70
98	1,590	59	21	52	81	62	151	57	435	58	34	62	68	72	18	72
99	1,218	60	30	50	49	65	105	56	312	53	32	66	46	61	25	84
100	1,773	59	27	59	59	64	138	54	494	63	22	64	54	72	19	79

